so that in 1894 he had discovered more than half of the known pairs of which the distance was less than 1″.

Burnham afterwards returned to Chicago as professor of practical astronomy at the University. The first volume of the Publications of the Yerkes Observatory consists of his great "General Catalogue of Double Stars," which has become the standard work of reference on the subject. He continued the work of discussing measures and orbits, and of drawing up lists of stars that needed observation, until within a few years of his death.

Burnham was elected a fellow of the Royal Astronomical Society in 1874 on the nomination of the Rev. T. W. Webb, whose "Celestial Objects" had first directed his attention to double stars. He was elected an associate in 1898, having received the gold medal in 1894.

A. C. D. C.

WE announce with regret the death on Thursday, March 31, of MR. T. E. GATEHOUSE at the age of sixty-six years. Mr. Gatehouse was for some forty years associated with our contemporary, the *Electrical Review,* of which he had become editorial and technical director. As a young man he was a pupil of Robert Sabine, one of the most able pioneers of electrical industry, and later he worked with Sir Charles Wheatstone and Sir Samuel Canning. From these he obtained a broad knowledge of electrical engineering in all its aspects, and especially of telegraphy, both on land and by submarine cable. As a young engineer he also took great interest in schemes for electric lighting, and himself held a number of patents for improvements in both the arc and incandescent lamp systems. In 1881 Mr. Gatehouse joined forces with a fellow-pupil under Sabine, Mr. R. H. Kempe, who was proprietor, with Mr. H. Alabaster, of the *Telegraphic Journal and Electrical Review* (afterwards the *Electrical Review*), and Mr. Gatehouse was made editor, a post which he held until a few years ago. Failing health compelled him to give up active work as editor, but as editorial and technical director he kept in touch with the journal, and lent his aid in a consultative capacity until a few days before his death occurred.

THE death is announced of MR. SYDNEY FISHER, one of the leading authorities on agriculture in Canada. Mr. Fisher was born in 1850, and educated at McGill University, and later at Cambridge. At the age of thirty-one years he entered the Dominion Parliament, and, with the exception of an interval lasting from 1891–96, was a representative in it continuously until 1911. He made a study of the principles of agriculture, and when Sir Wilfrid Laurier came into power in 1896 was appointed Minister of Agriculture, an office which he held for fifteen years. During his tenure of office Mr. Fisher initiated a progressive agricultural policy, the most important part of which was the establishment, in various parts of the Dominion, of experimental farms, where careful and profitable research has been undertaken. Mr. Fisher will also be remembered as the first vice-president of the International Institute of Agriculture convened at Rome in 1908.

THE death is announced of MR. ALEXANDER WYNTER BLYTH, which occurred on April 1 at the age of seventy-six years. Mr. Blyth was for forty years public analyst for the county of Devon and the borough of St. Marylebone, and a past-president of the Incorporated Society of Medical Officers of Health. He will be best remembered as the author of a number of books on public health, among which are "Foods: their Composition and Analysis," "Poisons: their Effects and Detection," and "A Manual of Public Health." He also communicated a number of papers to the Royal Society, the Chemical Society, and the Royal Sanitary Institute.

Notes.

AT the meeting of the Royal Society on May 5 the Croonian lecture will be delivered by Dr. Henry Head on "Release of Function in the Nervous System."

PROF. J. NORMAN COLLIE, professor of organic chemistry in the University of London, and Sir W. Morley Fletcher, Secretary of the Medical Research Council (Privy Council), have been elected members of the Athenæum under the provisions of the rule of the club which empowers the annual election by the committee of a certain number of persons "of distinguished eminence in science, literature, the arts, or for public service."

THE Institute of Physics will be inaugurated at a meeting to be held on Wednesday, April 27, at 6 p.m., in the hall of the Institution of Civil Engineers, Great George Street, Westminster. Sir Richard Glazebrook, the president, will preside, and Sir J. J. Thomson will deliver an address. Mr. A. J. Balfour is expected to be present and to extend a welcome to the institute. Non-members of the institute or of the societies associated with it may obtain tickets of admission on application to the Secretary, 10 Essex Street, Strand, W.C.2.

A GOOD deal of attention has been devoted in the medical, pharmaceutical, and general Press to the provisions of the Draft Regulations drawn up by the Home Office under the Dangerous Drugs Act of 1920. The drugs specified in the draft regulations are opium, morphine, diamorphine, cocaine, and ecgonine, and, with certain exceptions as regards pharmacists, medical men, dentists, and veterinary surgeons, the manufacture, possession, purchase, or sale of any of these drugs is prohibited except to persons duly licensed or otherwise authorised by the Home Office. Apparently a chemist successfully synthesising one of these drugs, such as morphine, without previously securing a licence for himself and the premises he works in, might be regarded as "manufacturing" the alkaloid, and thereby infringing the regulations. Similarly, he would require a licence before he could acquire and keep any of these drugs in his laboratory, and he would have to produce his stock for the inspection of any constable who desired to see it, and, if any of it had been used or otherwise disposed of, satisfy the constable that a record of the transaction had been kept in the proper form in the appropriate book. The regulations appear to have been prepared without consideration of the fact that drugs of this kind are in common use for purely scientific purposes, and it behoves chemists and others concerned to bring pressure to bear on the Home Office to ensure the exemption of scientific workers from the operation of the regulations when they come into force.

The half-yearly meeting of the council of the National Union of Scientific Workers was held at the University of London Club on Saturday, April 9, the president, Prof. L. Bairstow, in the chair. It was resolved unanimously that the council views with misgiving the subordination of scientific workers controlling scientific staffs to non-scientific officials in Government Departments; deplores the growing tendency of public bodies to reduce expenditure on education, particularly in neglecting to provide for further institutions for the study of science and technology, and by threatening existing institutions with closure, irrespective of their national utility; and will take steps to oppose the tendency to discriminate, solely on account of sex, between the salaries of scientific workers of the same grade and professional standing. The following two resolutions on secret research in universities were also adopted:—"That this council is of the opinion that it is neither practicable nor desirable that research for Government Departments or other bodies, demanding the maximum privacy in its pursuit and the greatest strictures on publication, should be undertaken under the auspices of a university or of one of its departments"; and "That the executive committee of the union be instructed to direct the attention of university authorities throughout the kingdom to the danger of undertaking (except in a national emergency) research under the Official Secrets Act or similar conditions in university buildings, as the pursuit of such research is hostile to the university tradition of freedom of teaching, research, and intercourse, the freedom of the university scientific worker, and the best interests of education."

It is announced that the biological expedition to Spitsbergen organised in Oxford University is to set out in June. Financial difficulties have been partly overcome, but, according to the *Times*, funds are still inadequate to allow the whole programme to be followed. The expedition, comprising ten or eleven members, will be under the leadership of the Rev. F. C. R. Jourdain, and will devote its attention principally to ornithological work on the west coast, although it is hoped that ice conditions will allow a visit to New Friesland. The promoters have been well advised, in view of their inexperience in Arctic conditions, to make use of Norwegian hunting sloops, and so have the assistance of expert seamen. If the ice conditions are normal this year, as they promise to be, the expedition should have an interesting time and do some useful biological work, especially on Prince Charles Foreland.

In commemoration of the quatercentenary of the death of Ferdinand Magellan on April 27, Mr. E. Heawood read a paper to the Royal Geographical Society on April 11 on the world-map before and after Magellan's voyage. Mr. Heawood showed the influence on cartography before Magellan's voyages of the misrepresentations, largely dating from Ptolemy, which reduced the circumference of the globe and extended land areas longitudinally. Thus the voyage across the Pacific did not promise to be so long as it was in reality. One result of Magellan's voyage was to give greater appreciation of the width of the Pacific Ocean, and another, curiously enough, was to bring into renewed prominence the conception of a great southern continent—an idea which dated from high antiquity and was revived by the discovery of Fuegia. Mr. Heawood is not inclined to believe that Magellan Strait was known previous to the Magellan voyages, and thinks that earlier indications of it on maps were prompted by the hope, rather than the knowledge, of its existence.

The second Herbertson memorial lecture of the Geographical Association was delivered by Dr. H. R. Mill in the map-room of the Royal Geographical Society on April 6. After references to the growth of geographical research in this country and to the career of the late Prof. Herbertson, the lecturer developed the theme of regional geographical study, and illustrated it by a detailed discussion of the problem of mapping the average rainfall of a region on a large scale. The steps by which the relation of average rainfall to the configuration of the land had been established were described, and stress was laid on the practical importance of such maps in planning waterworks and in developing water-power. The importance of amplifying such researches as had been made by establishing a hydrometric survey was insisted on, and the plan of a geography of inland waters laid down. For such work the river-basin was the natural unit, and the Ordnance Survey maps should be adapted to it by the insertion of watershed lines separating the valleys and by a series of levels along the stream-beds. The full description of the river system and *régime* would require the consideration of geological, botanical, and economic conditions as well as of meteorology.

An account of the twenty-fifth annual Congress of the South-Eastern Union of Scientific Societies was printed in Nature of June 24, 1920. The *South-Eastern Naturalist,* which has just been received, contains the proceedings and transactions of the union during 1920 under the presidency of Sir Edward Brabrook; the papers read at the congress are printed in full, and the reports made by the various committees and sections are given. The annual congress for 1921 will be held at Reading on June 8–11, and the president for 1921–22 is Prof. E. B. Poulton.

IN accordance with the provisions of the will of the late Dr. R. T. Nichols, the Royal Society of Medicine will offer triennially a prize of the value of 250*l.*, open to any British subject, for the most valuable contribution towards "the discovery of the causes and the prevention of death in childbirth from septicæmia." The society is open to receive competing essays for the first award until, at latest, June 30, 1924. The works submitted must be typewritten or printed in English, marked "Nichols Prize," and accompanied by the name and address of the author. Work already published will be eligible provided it appeared not earlier than June 30, 1921. Further particulars of the prize are obtainable from the Secretary of the Royal Society of Medicine, 1 Wimpole Street, W.1.

AT the fourth annual meeting of the National Association of Industrial Chemists, held at Sheffield recently and presided over by Mr. A. B. Searle, the general secretary's report on the activities and progress of the association during 1920 was read. At present there are nearly 1100 members on the register, and a slight gain in membership has been made. The economic status of the members has been considered by a special committee, and a scale submitted to, and approved by, the national council. These endeavours to obtain better remuneration were upset by unforeseen circumstances, but the experience gained shows that the association has prospects of doing good work in this direction when trade is more normal. Another committee discussed preliminaries with the British Association of Chemists in order to try to bring about an amalgamation, and negotiations are still proceeding. In the interests of the industrial chemist it is regarded as essential that every effort should be made to obtain an organisation strong both numerically and financially, and one that is fully representative of the industrial chemists of Great Britain. It is possible that much headway may be made in this direction by amalgamation with the British Association of Chemists, and possibly by affiliation with the Non-manual Workers' Federation. All communications with reference to the association should be addressed to the General Secretary, The White Building, Fitzalan Square, Sheffield.

UNDER the title of "La Dame de l'érable" in *L'Anthropologie* (vol. xxx., Nos. 3-4) M. L. Siret publishes an elaborate, fully illustrated paper on the cult of trees in Druidism. The author reviews the occurrence of tree cults in ancient France, with comparative illustrations from the East as far as Nineveh, and certain allied questions such as the extension of Eneolithic commerce towards the north and the exportation of precious metals to the west.

THE myths of the Alsea Indian tribe of Oregon are collected, with the original texts, by Mr. L. I. Frachtenberg in Bulletin No. 67 of the Bureau of American Ethnology. Generally speaking, this mythology is characteristic of that area of the north-west which embraces northern California, Oregon, and Washington. It is typical of the north-west in so far as it is lacking in migration myths such as are found among certain tribes of the south-west and east. On the other hand, it is intimately connected with the mythology of the tribes of northern California, and it exhibits special points of contact with the folk-lore of their neighbours to the north, especially the Salish. These points of resemblance and contrast are carefully worked out in the introduction to the present volume.

IN the March issue of *Man* Mr. Ainsworth Dickson describes the only survivals of the regalia of the Wa-Vumba tribe in the delta of the Umba River, which formerly marked the coastal boundary of German and British East Africa. They are descendants of a party of Persians who migrated about A.D. 1200 to this district from the plains of Sheraji. About A.D. 1700 the country was swept by a horde of cannibals from the south, and many of the people removed for safety to the adjacent Island of Wassein, where they founded a city. The objects now described consist of drums, horns, and cymbals used at the enthronement of a sultan, and with the ruins of a few mosques and some Durbar customs they form the only material evidence of a once-flourishing Persian colony on African soil.

SOME interesting notes made on a cuckoo during the deposition of its eggs appear in *British Birds* for March. The author, Mr. Edgar Chance, kept a single female under observation throughout the whole of this time, which lasted until no fewer than twenty-one eggs had been laid. All were dropped, at intervals of forty-eight hours, into the nests of meadow pipits, save in the case of the fifteenth egg, for which the nest of a tree-pipit was selected, there being no meadow-pipit's nest available. Deposition always took place in the afternoon, and an egg was never left in a nest until after the first egg of the foster-parents had been laid. On each occasion, after dropping her egg into the nest, she removed one of her dupe's eggs, and this was either swallowed at the nest-side or borne away and disposed of. Apparently only when forced by dire necessity will she leave an egg in a nest in which incubation has commenced.

THE value of the statistics of variation for the study of fossils is discussed at great length by Dr. Hans Klähn in the "Berichte" of the Natural History Society of Freiburg im Breisgau (vol. xxii., part 2, 1920). Numerous tables of measurements of brachiopods, ammonites, and species of Helix are given, and various mathematical treatments are attempted to determine the limits of species and varieties. Part of the memoir is a criticism of Wedekind's work on the principles and methods of biostratigraphy.

WE have received some parts of the seventh volume of *Iberica*, a weekly review of the sciences and their applications published in Tortosa. The periodical is well illustrated and written in an attractive manner, containing general articles and summaries besides the usual news and reviews of recent publications. In Spain it cannot fail to spread an interest in the progress of science, while to other countries it affords a means of obtaining news of Spanish scientific work. One original article gives an account of the Medusæ found on the coast of Catalonia, and another describes the geology of the country between Tortosa and Castellón. There is also an illustrated article on the National Museum of Natural History at Madrid.

AMONG recent publications on mineral oil may be mentioned Bulletin 652, U.S. Geol. Survey, on "The Cushing Oil and Gas Field, Oklahoma," and Bulletin 656 on "Anticlines in the Bighorn Basin, Wyoming." The Cushing field has been opened up since 1912 with such rapidity and success that considerable waste occurred. Its describer, C. H. Beal, believes that the oil and gas have collected from the broad gathering-ground provided by the gentler slope of the anticlinal to the west, the gas arriving first into the crest of the fold, and banking up a following oil-pool west of it. The field in southern Wyoming is in Cretaceous strata, and here again it is pointed out, by D. F. Hewett and C. T. Lupton, that there is most likelihood of oil where upfolds occur near large areas of gently rising beds. The area of supply controls the quantity in the anticlines. In the "Summary of Progress of the Geological Survey of Great Britain for 1919" (1920, 2*s*. 6*d*.) some details are given of the recent borings for oil in Derbyshire and Staffordshire. The Lower Carboniferous shales, and not the limestone, are regarded as the probable source of such oil as has been found.

WE have received the fifth list (for 1917) of the earthquakes registered at the observatory of De Bilt, Holland. This station is provided with a pair of Galitzin seismographs, a Wiechert astatic seismograph, and a pair of Bosch horizontal pendulums. The catalogue, which is one of the most complete issued, gives for each of the 394 earthquakes recorded the time, period, and amplitude of every phase, with a summary of the times of the principal phases at other observatories and the position of the epicentre when that is known. The munitions explosion in the north of England on October 1, 1917, was manifested in Holland by the rattling of windows, etc., while that of East London on January 19, 1917, apparently passed unnoticed.

THE Danish Meteorological Institute has published the issue for 1920 of the annual report on the state of the ice in the Arctic seas. The year showed several peculiarities in amount and distribution, although information was lacking from many regions. In the Barents Sea ice was much scarcer than usual, and there was open water as far east as Novaya Zemlya all the summer, while even the Kara Sea offered fewer difficulties than in normal years. On the west coast of Spitsbergen the condition differed little from the normal, but Storfjord was exceptionally free from ice in late summer. There is little information from the east coast of Greenland, but more ice than usual passed round Cape Farewell into Davis Strait. This meant that the ice must have been packed close against the east coast, since the shores of Iceland were practically free from ice throughout the year. On the Newfoundland Banks icebergs were numerous, and drifted somewhat further south than usual during the first half of the year. In Davis Strait and Melville Bay the ice was more abundant than usual during the spring and early summer.

THE index-numbers of vols. xxiii. of the Physics and Electrical Engineering Sections of *Science Abstracts* complete the volumes for the year 1920. As compared with the volumes for 1919, the Physics Section with its 750 pages shows an increase of about 90 pages, and the Electrical Engineering Section with 633 pages an increase of 150 pages. The number of physics abstracts has increased from 1580 to nearly 1670, and that of the electrical engineering abstracts from 940 to nearly 1120. These changes bring the two volumes back to pre-war dimensions, although the number of articles abstracted is still considerably below the pre-war number. Unless there is a marked change in the importance of the articles abstracted, this increase in the average length of an abstract cannot be regarded as altogether satisfactory. Apart from this tendency, the volumes retain their positions as annual records of the progress of physics and electrical engineering, with which no worker who requires accurate and up-to-date information can afford to dispense.

AN interesting paper by Mr. G. Stead was read to the Institution of Electrical Engineers on March 16 in which the effect of electron emission on the temperature of the filament and anode of a thermionic valve was investigated. It was found that the temperature at any point on a tungsten filament which was emitting electrons was altered by the passage of the emission current through the filament and by the latent heat of evaporation of the electrons. Direct measurements were made with an optical pyrometer of the temperature along the emitting filament. It was found that the distribution of temperature was unsymmetrical, the negative limb being hotter than the positive limb. An account is also given of measurements of the temperature of an anode undergoing electron bombardment. The curve obtained, which shows the relation between the anode temperature and the number of watts dissipated by the anode per sq. cm. of surface, will prove useful to manufacturers.

ON March 17 Sir William Noble read a paper to the Institution of Electrical Engineers on "The Long-distance Telephone System of the United Kingdom." It deals mainly with the improvements that have been made in line-plant design during the last ten years. The recent expansion of long-distance telephony has led to a congestion of the pole lines along roads, railways, and canals. Improvements, however, in underground long-distance telephone cables have led to a solution of the difficulty, and practically all the new trunk lines are, in consequence, underground. The three-electrode thermionic amplifier can be used as a telephone repeater, and its general introduction has revolutionised long-distance communication schemes. Amplifiers can also be used to obtain duplexing—that is, both-way working of the line. "Wired wireless" or, as it is better called, "high-frequency carrier-wave telephony" was also discussed, but its practical use in this country would be very limited.

The sensitising of photographic emulsions for green has always presented difficulties The well-known "gap in the green" of orthochromatic plates, which caused certain natural greens to be rendered too dark, is perhaps the most notable of the irregularities. We learn from a communication of Dr. König's in this month's Colour Supplement of the *British Journal of Photography* that Dr. Robert Schuloff, of the Höchst dye works, has prepared a new dye, "pinaflavol," which Dr. Eder finds to be "the long-required green sensitiser, having a maximum at about the line E, falling sharply to D, and extending without gaps to F. . . . It yields a strong, even, spectrum band over the whole of the green, blue, and violet." The rapid fall of sensitiveness at D is of especial advantage in three-colour photography, as the green record can be taken with a yellow filter which can easily be obtained of great transparency to green. Hitherto it has been necessary to cut off the red as well as the blue by means of a green filter, and all green filters reduce very notably the very colour that it is desired that they should transmit. Pinaflavol is used in the same manner as the cyanine and isocyanine sensitisers.

The salving of the Italian battleship *Leonardo da Vinci* forms the subject of an illustrated article in the *Engineer* for March 18. This ship was blown up at anchor at Taranto in 1916, the rent in the hull measuring more than 500 sq. ft. and extending up both sides. The vessel settled down by the stern, capsized to port, and sank in six fathoms of water. She is 650 ft. long, the displacement is 22,380 tons, and she is armed with thirteen 12-in. guns. Being extremely valuable, a committee was set up to report on different schemes of salvage and to arrange for carrying out the work. It was finally decided to refloat the ship upside down by means of compressed air, to tow her into the Taranto dry dock, and there to repair the damage so that she could afterwards be righted at sea. The superstructure, turrets, guns, etc., were detached and left provisionally at the bottom of the sea in order to permit the vessel to enter the dry dock in an inverted state. The whole of the projected work has now been accomplished, and the ship was righted on January 24 last. The salvage of this vessel constitutes a most remarkable and unprecedented feat. It is also notable from the engineering point of view, since it has proved possibilities for the use of compressed air which had not previously been put to the test.

A very useful catalogue (New Series, No. 1) of second-hand books and journals dealing with zoology has just been received from Messrs. Wheldon and Wesley, Ltd., 38 Great Queen Street, W.C.2. It contains the titles of no fewer than 2481 works (many from the library of the late F. Du Cane Godman) in the departments of Pisces, Reptilia and Batrachia, Aves, Mammalia, Anthropology, Domestic Quadrupeds and Birds, General Systems and Early Treatises, and General Faunas; also text-books and miscellanea. The catalogue can be obtained free of charge upon application to the publishers.

On p. 85 of our issue for March 17 we referred to Mr. A. C. Kinsey's papers on American Cynipidæ or gall-wasps. Owing to an oversight they were attributed to the Proceedings of the U.S. National Museum, whereas they were published in Bulletin 42 of the American Museum of Natural History.

Our Astronomical Column.

Discovery of Pons-Winnecke's Comet.—The comet Pons-Winnecke was detected by Prof. Barnard on April 10d. 21h. 17·0m. G.M.T., R.A. 15h. 54m. 38s., N. decl. 36° 38′. Daily motion 50′ in north following direction. The indicated date of perihelion is June 11 or 12. There will be a fairly close approach to the earth, but no collision. Meteors are very probable about June 27.

Reid's Comet.—This comet is brightening and coming into a more convenient position for European observers. Many observations are reported, the latest being made at Copenhagen by Miss Vinter-Hansen: G.M.T. April 4, 14h. 47·9m., apparent R.A. 20h. 26m. 31·40s., apparent S. declination 2° 38′ 5″.

On April 2 the comet was described as small and bright, about 8th magnitude, with strong central condensation, no tail seen, but moon bright. It remained visible in the dawn as long as 9th magnitude stars. The orbit and ephemeris given in Nature for March 31 are not much in error, and there is every reason to anticipate that the comet will attain faint naked-eye visibility. It will pass close to the North Pole in mid-May.

Double Stars.—Mr. J. Jackson contributes an article on this subject to the *Observatory* for March, in which he examines the criteria for distinguishing physical pairs from optical ones. It is pointed out that two stars of the 9th magnitude, or brighter, within 5″ of each other are likely to form a physical pair. Wide pairs with appreciable relative motion are in most cases optical; without appreciable relative motion their state is doubtful unless there is a considerable common proper motion.

If the relative motion of a pair of stars is less than P.M./10, they are probably binary. Some observers have been very reluctant to admit the first principle, and have questioned the binary character even of such obvious pairs as 61 Cygni.

Mr. Jackson applies his principles to selected portions of Burnham's General Catalogue, classifying several stars as obviously binary, others as almost certainly optical. He passes on to consider the hypothetical parallax, on the assumption that the mass of each system is twice that of the sun. He shows that this may often be estimated, even if only a small portion of the orbit has been observed; where its value is large the star should be put on the list of parallax stars. If the observed parallax is not very different from the hypothetical one, the star is probably a physical binary. Thus β 4972 and β 7514 are shown to be respectively physical and optical.